# Documentation for ARM Template Deployment for Rand Enterprises Corporation

## Introduction
This document outlines the steps taken to **create and deploy an Azure Resource Manager (ARM) template** for Rand Enterprises Corporation. The objective of this deployment is to establish a secure and efficient infrastructure
that meets the requirements outlined in the problem statement provided by the operations team. The deployment **includes defining networking architecture, creating storage accounts, provisioning virtual machines, and implementing role-based access control (RBAC)** to adhere to the principle of least privilege.

## Problem Statement Overview
Rand Enterprises Corporation aims to implement infrastructure as code using ARM templates. The key requirements include:

- **Defining Networking Architecture**: Establish a virtual network and subnets to facilitate secure communication between resources.
- **Creating Storage Accounts and Virtual Machines**: Provision storage accounts for image-based content and virtual machines to host applications.
- **Ensuring Secure Communication**: Restrict access to the storage account from the public internet and allow communication only through the internal Azure network.
- **Reusable Template for Automation**: Create a template that can be reused for future deployments.
- **Implementing RBAC**: Define access for the operations team to ensure they can only deploy the necessary resources.

## ARM Template Structure
The ARM template is structured to include the following key components:
### 1. Parameters Section
The parameters section defines the inputs required for the deployment, including:

- **sshPublicKey**: The SSH public key for VM authentication.
- **roleDefinitionId**: The ID of the role definition for RBAC.
- **operationsTeamPrincipalId**: The Object ID of the operations team in Azure Active Directory.

### 2. Resources Section
The resources section defines the various Azure resources to be deployed, including:

- **Virtual Network**: A virtual network (RandVNet) with subnets for application and storage.
- **Network Security Group**: A network security group (RandNSG) to control inbound and outbound traffic.

- **Network Interfaces**: Network interfaces for the virtual machines.
- **Virtual Machines**: Virtual machines (RandVM1) configured with Linux and SSH access.
- **Storage Account**: A storage account (umrandstorageaccountum) configured with service endpoints and network ACLs to restrict access.
- **Blob Container**: A container within the storage account for storing images.
- **Role Assignments**: Role assignments to grant the operations team the necessary permissions.

## 3. Service Endpoints Configuration

To ensure secure communication between the virtual machines and the storage account, service endpoints were configured in the storage account's **networkAcls** section.
This allows access to the storage account only from the specified virtual network, effectively preventing public internet access.

## 4. Role-Based Access Control (RBAC)

RBAC was implemented to ensure that the operations team has the necessary permissions to deploy and manage the resources defined in the ARM template. The role assignment was configured to grant the operations team the Contributor role, allowing them to manage resources while adhering to the principle of least privilege.

## Deployment Process

The deployment process involved the following steps:
- **Template Creation**: The ARM template was created based on the requirements outlined in the problem statement.
- **Parameter Values**: The necessary parameter values, including the SSH public key and the Object IDs for the operations team, were defined.
- **Deployment Execution**: The ARM template was deployed using Azure CLI or the Azure portal, ensuring that all resources were provisioned as specified.
- **Validation**: After deployment, the resources were validated to ensure they were created successfully and met the security and access requirements.

## Screenshots of Successful Deployments

## umRandResourceGroup
Resource group

🔍 Search

- ⊞ Overview
- ▦ Activity log
- 🔑 Access control (IAM)
- 🏷 Tags
- ⋅⋅ Resource visualizer
- ⚡ Events
- › Settings
- › Cost Management
- › Monitoring
- › Automation
- › Help

+ Create   ⊞ Manage view ⌄   🗑 Delete resource group   ↻ Refresh   ↓ Export to CSV   ⌕ Open query   ⋯   🏷 Assign tags   → Move ⌄   🗑 Delete   ↓ Export template   ⋯

∧ Essentials                                                                                       JSON View

Subscription (move) : Simplilearn HOL 11                         Deployments : 1 Succeeded

Subscription ID    : 1c6f2739-fd08-4ed7-803e-3fa4bcc9320c        Location     : East US

Tags (edit)   : Add tags

**Resources**   Recommendations

| Filter for any field... | Type equals **all** ✕ | Location equals **all** ✕ | 🏷 Add filter |

Showing 1 to 6 of 6 records.   ☐ Show hidden types ⓘ                     No grouping ⌄    ≣ List view ⌄

| ☐ | Name ↑↓ | Type ↑↓ | Location ↑↓ | |
|---|---------|---------|-------------|---|
| ☐ | 🛡 RandNSG | Network security group | East US | ⋯ |
| ☐ | 🖥 RandVM1 | Virtual machine | East US | ⋯ |
| ☐ | 💾 RandVM1_disk1_67f07481f7d346e49e0f11d184caeaa1 | Disk | East US | ⋯ |
| ☐ | 🔲 RandVM1NIC | Network Interface | East US | ⋯ |
| ☐ | ↔ RandVNet | Virtual network | East US | ⋯ |
| ☐ | ▤ umrandstorageaccountum | Storage account | East US | ⋯ |

**All necessary resources within the resource group - all automate via ARM template**

< Previous    Page [  ] of 0    Next >                                     ⚲ Give feedback

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## ▤ umrandstorageaccountum | Containers
Storage account

🔍 Search

- ⊞ Overview
- ▦ Activity log
- 🏷 Tags
- 🔧 Diagnose and solve problems
- 🔑 Access Control (IAM)
- ⊡ Data migration
- ⚡ Events
- 🗄 Storage browser
- 🚚 Storage Mover
- 🧩 Partner solutions
- ∨ Data storage
  - ▤ Containers
  - 📁 File shares
  - 🗔 Queues
  - ▦ Tables
- › Security + networking
- › Data management
- › Settings
- › Monitoring
- › Monitoring (classic)

+ Container   ⧉ Change access level   ↺ Restore containers ⌄   ↻ Refresh   🗑 Delete   ⚲ Give feedback

| Search containers by prefix | ⬤ Show deleted containers |

| ☐ | Name | Last modified | Anonymous access level | Lease state | |
|---|------|---------------|------------------------|-------------|---|
| ☐ | images | 11/10/2024, 3:55:40 PM | Private | Available | ⋯ |

**Storage account with private container**

```
129     {
130         "type": "Microsoft.Storage/storageAccounts",
131         "apiVersion": "2023-04-01",
132         "name": "umrandstorageaccountum",
133         "location": "[resourceGroup().location]",
134         "sku": {
135             "name": "Standard_LRS"
136         },
137         "kind": "StorageV2",
138         "properties": {
139             "networkAcls": {
140                 "bypass": "AzureServices",
141                 "virtualNetworkRules": [
142                     {
143                         "id": "[resourceId('Microsoft.Network/virtualNetworks/subnets', 'RandVNet', 'StorageSubnet')]"
144                     }
145                 ],
146                 "defaultAction": "Deny",
147                 "serviceEndpoints": [
148                     {
149                         "service": "Microsoft.Storage",
150                         "locations": [
151                             "[resourceGroup().location]"
152                         ]
153                     }
154                 ]
155             }
156         }
```

## Conclusion

The deployment of the ARM template for Rand Enterprises Corporation
successfully established a secure and efficient infrastructure that
meets the specified requirements. By leveraging ARM templates, the operations team can
automate future deployments, ensuring consistency and adherence to best practices in
cloud resource management. The implementation of service endpoints
and RBAC further enhances the security posture of the deployed resources, aligning
with the organization's goals of secure and efficient operations.

## Future Considerations

- **Monitoring and Logging**: Implement monitoring and logging solutions to
  track resource usage and access patterns.
- **Template Versioning**: Consider versioning the ARM template to manage changes
  and updates effectively.
- **Custom Roles**: Explore the creation of custom roles if the built-in roles do not
  fully meet the operational needs of the team.

This documentation serves as a comprehensive guide to the
ARM template deployment process for Rand Enterprises Corporation, providing
clarity on the steps taken and the rationale behind each decision.